

Federal Communications Commission

§ 25.224

earth station EIRP spectral density levels to be compliant with those specified in paragraph (b) of this section.

[72 FR 50030, Aug. 29, 2007, as amended at 79 FR 8324, Feb. 12, 2014]

§ 25.224 Protection of receive-only earth stations in the 17/24 GHz BSS.

(a) Notwithstanding §25.209(c) of this part, receive-only earth stations oper-

ating in the 17/24 GHz broadcasting-satellite service can claim no greater protection from interference than they would receive if the equivalent antenna diameter were equal to or greater than 45 cm and the antenna meets the copolar and cross-polar performance patterns represented by the following set of formulas (adopted in Recommendation ITU-R BO.1213-1, dated November 2005) that are valid for $D/\lambda \geq 11$:

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(1) Co-polar pattern:

$$G_{co}(\varphi) = G_{max} - 2.5 \times 10^{-3} \left(\frac{D}{\lambda} \varphi \right)^2 \text{ for } 0 \leq \varphi < \varphi_m$$

where:

$$\varphi_m = \frac{\lambda}{D} \sqrt{\frac{G_{max} - G_1}{0.0025}}$$

$$G_{max} = 10 \log \left(\eta \left(\frac{\pi D}{\lambda} \right)^2 \right)$$

$$G_1 = 29 - 25 \log \varphi_r, \text{ and } \varphi_r = 95 \frac{\lambda}{D}$$

$$\begin{aligned} G_{co}(\varphi) &= G_1 && \text{for } \varphi_m \leq \varphi < \varphi_r \\ G_{co}(\varphi) &= 29 - 25 \log \varphi && \text{for } \varphi_r \leq \varphi < \varphi_b \text{ where } \varphi_b = 10^{(34/25)} \\ G_{co}(\varphi) &= -5 \text{ dBi} && \text{for } \varphi_b \leq \varphi < 70^\circ \\ G_{co}(\varphi) &= 0 \text{ dBi} && \text{for } 70^\circ \leq \varphi < 180^\circ \end{aligned}$$

(2) Cross-polar pattern:

$$G_{cross}(\varphi) = G_{max} - 25 \text{ for } 0 \leq \varphi < 0.25 \varphi_0$$

where:

$$\varphi_0 = 2 \frac{\lambda}{D} \sqrt{\frac{3}{0.0025}} = 3 \text{ dB beamwidth}$$

$$G_{cross}(\varphi) = G_{max} - 25 + 8 \left(\frac{\varphi - 0.25 \varphi_0}{0.19 \varphi_0} \right) \text{ for } 0.25 \varphi_0 \leq \varphi < 0.44 \varphi_0$$

$$G_{cross}(\varphi) = G_{max} - 17 \text{ for } 0.44 \varphi_0 \leq \varphi < \varphi_0$$

$$G_{cross}(\varphi) = G_{max} - 17 + C \left| \frac{\varphi - \varphi_0}{\varphi_1 - \varphi_0} \right| \text{ for } \varphi_0 \leq \varphi < \varphi_1 \text{ where } \varphi_1 = \frac{\varphi_0}{2} \sqrt{10.1875}$$

$$\text{and } C = 21 - 25 \log(\varphi_1) - (G_{max} - 17)$$

$$G_{cross}(\varphi) = 21 - 25 \log \varphi \text{ for } \varphi_1 \leq \varphi < \varphi_2 \text{ where } \varphi_2 = 10^{(26/25)}$$

$$G_{cross}(\varphi) = -5 \text{ dBi} \text{ for } \varphi_2 \leq \varphi < 70^\circ$$

$$G_{cross}(\varphi) = 0 \text{ dBi} \text{ for } 70^\circ \leq \varphi < 180^\circ$$

where:

D : equivalent antenna diameter

λ : wavelength expressed in the same unit as the diameter

φ : off-axis angle of the antenna relative to boresight (degrees)

η : antenna efficiency = 0.65

(b) Paragraph (a) of this section does not apply to 17/24 GHz BSS telemetry earth stations. Those earth stations are subject to the antenna performance standards of § 25.209(a) and (b) of this part. [72 FR 50031, Aug. 29, 2007]